

ERODIUM MALACOIDES (GERANIACEAE), NEW TO TEXAS

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ABSTRACT

Erodium malacoides (Geraniaceae) is reported as an addition to the flora of Texas. A description of the species and a key for identifying the Texas species of *Erodium* are provided.

RESUMEN

Se cita *Erodium malacoides* (Geraniaceae) como una nueva adición a la flora de Texas. Se aporta una descripción de la especie y una clave de las especies de *Erodium* de Texas.

Erodium L'Hér. comprises ca. 60 species of annual or biennial, rosette-forming herbs widespread in temperate and subtropical regions of the Old World and New World (Mabberley 1997). Three species have previously been recorded from Texas: the native *E. texanum* A. Gray, which is broadly distributed across central and southern portions of the state west to Utah and California, and the non-native species *E. cicutarium* (L.) L'Hér. and *E. botrys* (Cav.) Bert. (Jones et al. 1997). In Texas, *E. cicutarium* occurs in a variety of disturbed habitats in central, northern, and western regions of the state, while *E. botrys* has been collected from similar habitats in Bexar, Taylor, and Throckmorton counties (Correll & Johnston 1970; Turner et al. 2003).

In the spring of 2005, the senior author discovered a small population of *Erodium malacoides* (L.) Willd., a species previously unknown from the state, established on a disturbed site in Hays County, Texas. By 2006 the population had increased in size to hundreds of individual plants and occupied a substantially larger area, indicating a potential for naturalization. In the system proposed by Pysek et al. (2004), *E. malacoides* would be categorized as a "casual alien" in Texas.

Voucher specimens: **U.S.A. TEXAS. Hays Co.:** E side of northbound frontage road of Interstate Hwy. 35, City of San Marcos, N29° 53' 38", W97° 54' 31", 02 May 2006, Aplaca 287 (SWT); W side of northbound frontage road of Interstate Hwy. 35, City of San Marcos, N29° 53' 39", W97° 54' 31", 02 May 2006, Aplaca 288 (SWT); E side of northbound frontage road of Interstate Hwy. 35, City of San Marcos, N29° 53' 45", W97° 54' 25", 02 May 2006, Aplaca 289 (SWT);

We can only speculate as to how *E. malacoides* may have been introduced at this location. Several years ago, activity associated with the construction of a new entrance ramp onto the interstate highway disturbed portions of the area now occupied by the species. The seed mix used for revegetation of the highway right-of-way, soil brought in as fill material, or vehicular traffic from Mexico represent the most plausible seed sources.

Erodium malacoides is native to southern Europe (Brandes 1995) but has become naturalized across the Mediterranean region (El Hadidi et al. 1984). It has been introduced as widely as Australia and New Zealand (Webb et al. 1988; Westbrooke & Florentine 2005), South America (Figueroa et al. 2004), and North America, where it has been reported from a number of Mexican states (Villaseñor & Espinosa-García 2004) and from



FIG. 1. **Upper photo:** Individual plant of *Erodium malacoides* from Hays Co., Texas, showing the characteristic simple, palmately lobed leaf and relatively small (ca. 10 mm diam.) flower. **Lower photo:** Close-up of flower showing the glandular pubescence of the calyx and the broad, entire-margined staminodes.

California (Taylor 1993), New York (Mitchell & Tucker 1997) and Massachusetts (Magee & Ahles 1999) in the U.S.A.

Plants of *E. malacoides* (Fig. 1) are annual herbs with decumbent to ascending, puberulent stems that are glandular at the nodes. The leaves are simple, 4–15 cm long including the petiole, which is generally longer than the blade. The leaf blades are ovate, crenate to shallowly palmately lobed, and puberulent. The small flowers are borne in umbellate clusters and have glandular-pubescent sepals 4–6 mm long, lavender to purple petals about as long as the sepals, five fertile stamens, and five broad, entire-margined staminodes. The fruit is a five-parted schizocarp that separates from the style column into single-seeded segments, each consisting of an indehiscent fusiform body with a more or less rounded, glandular apical pit subtended by a single furrow, and a persistent style segment that becomes tightly coiled when dry. The following key is provided to distinguish among the four species of *Erodium* presently known from Texas.

KEY TO THE SPECIES OF *ERODIUM* IN TEXAS

1. Leaf blades simple, often shallowly or deeply palmately lobed
 2. Stems appressed-canescenscent; sepals 5–10 mm long, apically strigose; petals unequal, 7–12 mm long; staminodes long-awned, conspicuously ciliate; fruit body 5–8 mm long, the pit transversely elliptic and eglandular, furrows absent; style column 3–7 cm long _____ **E. texanum**
 2. Stems puberulent, the nodes glandular; sepals 4–6 mm long, glandular; petals equal, 4–6 mm long; staminodes awnless, entire-margined; fruit body 3–5 mm long, the pit \pm round, glandular, and usually subtended by one furrow; style column 2–3 cm long _____ **E. malacoides**
1. Leaf blades deeply pinnately lobed to pinnately compound
 3. Stem pubescence glandular; sepals 3–5 mm long; fruit body 4–7 mm long, the pit subtended by a single furrow or furrow absent; style column 2–5 cm long _____ **E. cicutarium**
 3. Stem pubescence eglandular; sepals 10–13 mm long; fruit body 8–11 mm long, the pit usually subtended by two furrows; style column 5–12 cm long _____ **E. botrys**

REFERENCES

- BRANDES, D. 1995. The flora of old town centres in Europe. In: Sukopp, H., M. Numata and A. Huber, Urban ecology as the basis of urban planning. SPB Academic Publishing bv, Amsterdam, The Netherlands. Pp. 49–58.
- CORRELL, D.S. and M.C. JOHNSTON. 1970. Manual of the vascular plants of Texas. Texas Research Foundation, Renner.
- EL HADIDI, M.N., A.A. FAYED, and S.M. EL NAGGAR. 1984. Systematic revision of *Erodium* (Geraniaceae) in Egypt. *Pl. Syst. Evol.* 144:307–314.
- FIGUEROA, J.A., S.A. CASTRO, P.A. MARQUET, and F.M. JAKSIC. 2004. Exotic plant invasions to the Mediterranean region of Chile: causes, history and impacts. *Revista Chilena Hist. Nat.* 77:465–483.
- JONES, S.D., J.K. WIPFF, and P.M. MONTGOMERY. 1997. Vascular plants of Texas: a comprehensive checklist including synonymy, bibliography and index. Univ. of Texas Press, Austin.
- MABBERLEY, D.J. 1997. The plant-book. A portable dictionary of the higher plants, 2nd ed. Cambridge Univ. Press, Cambridge.
- MAGEE, D.W. AND H.E. AHLES. 1999. Flora of the Northeast. A manual of the vascular flora of New England and adjacent New York. Univ. of Massachusetts Press, Amherst.
- MITCHELL, R.S. and G.C. TUCKER. 1997. Revised checklist of New York State plants. Contributions to a flora of New York State, checklist IV. *New York State Mus. Bull.* 790:1–400.
- PYSEK, P., D.M. RICHARDSON, M. REJMÁNEK, G.L. WEBSTER, M. WILLIAMSON, and J. KIRSCHNER. 2004. Alien plants in checklists and floras: towards better communication between taxonomists and ecologists. *Taxon* 53:131–143.

- TAYLOR, M.S. 1993. *Erodium*. In: Hickman, J.C., ed. The Jepson manual: higher plants of California. Univ. of California Press, Berkeley. Pp. 672–673.
- TURNER, B.L., H. NICHOLS, G. DENNY, and O. DORON. 2003. Atlas of the vascular plants of Texas. *Sida, Bot. Misc.* 24:1–888.
- VILLASEÑOR, J.L. and F.J. ESPINOSA-GARCÍA. 2004. The alien flowering plants of Mexico. *Diversity Distrib.* 10:113–123.
- WEBB, C.J., W.R. SYKES, and P.J. GARNOCK-JONES. 1988. Flora of New Zealand IV: naturalized dicots, gymnosperms, ferns and fern allies. Manaaki Whenua Press, Lincoln, New Zealand.
- WESTBROOKE, M.E. and S.K. FLORENTINE. 2005. Rainfall-driven episodic flood events: are they a major factor in moulding New South Wales arid land vegetation patterns? *Austral. Geogr.* 36:171–181.